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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/680,391 | 10/07/2003 | Ford B. Grigg | 2269-3933.3US<br>(99-0086.03 | 5860 |

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TRASK BRITT
P.O. BOX 2550
SALT LAKE CITY, UT 84110

| EXAMINER |
|---|
| CHU, CHRIS C |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2815 | |

DATE MAILED: 12/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|---|---|---|
| **Office Action Summary** | **Application No.**<br>10/680,391 | **Applicant(s)**<br>GRIGG, FORD B. |
| | **Examiner**<br>Chris C. Chu | **Art Unit**<br>2815 |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 05 November 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1 - 21 is/are pending in the application.

4a) Of the above claim(s) 6,7,15 and 21 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1 – 5, 8 – 14 and 16 – 20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 07 October 2003 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 11/5;01/09;12/15 .

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Species I in the reply filed on November 5, 2004 is acknowledged.

Elected claims: 1 – 5, 8 – 14 and 16 – 20.

Non-elected claims: 6, 7, 15 and 21.

### *Response to Amendment*

2. Applicant's amendment filed on November 5, 2004 has been received and entered in the case.

### *Drawings*

3. The drawings are objected to because:

(a) In Fig. 14, the reference number " 50' " is located in two different places. Examiner request to remove the bottom reference number " 50' " because it gives a viewer a wrong impression such as two semiconductor device packages 50' are attached to each other.

(b) In Fig. 9, applicant should use Roman numerals for the broken line instead of Arabic numerals "10 – 10" because of an Arabic numeral "10" is already used to indicate an interposer in the figures.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1 – 5, 9, 10 and 16 – 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al. (JP 10-98130 and U.S. Pat. No. 6,013,946: The Japanese publication is the basis for

the rejection under 102(b). For ease of understanding, the use reference will be cited as needed. Both the US and JP references share priority from Korean application 96-39319).

Regarding claim 1, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 an interposer for use in a semiconductor device package (100), comprising:

- a substrate (120a) including a first surface, a second surface opposite the first surface, and at least one slot (123 in Fig. 2) through the substrate, the at least one slot opening to the first surface and the second surface;
- at least one first contact pad (pads that are formed on the substrate 120a and connected to the wire 150) on the substrate, the at least one first contact pad being located proximate the at least one slot;
- at least one second contact pad (122) on the substrate;
- at least one electrical trace (121; column 5, lines 16 – 19 of U.S. Pat. No. 6,013,946) communicating at a first end thereof with the at least one first contact pad and at a second end thereof with the at least one second contact pad; and
- at least one upwardly protruding dam (115 and 141) positioned on the second surface of the substrate so as to laterally surround at least a portion of the at least one slot (see Fig. 1).

Regarding claim 2, lee et al. discloses in e.g., Fig. 2 the at least one upwardly protruding dam (115) completely laterally surrounding the at least one slot.

Regarding claim 3, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one first contact pad (pads that are formed on the substrate 120a and connected to the wire 150) being located on the second surface of the substrate of the interposer.

Regarding claim 4, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one upwardly protruding dam (115 and 141) at least partially laterally surrounds the at least one first contact pad.

Regarding claim 5, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one upwardly protruding dam (115 and 141) completely laterally surrounds the at least one first contact pad.

Regarding claim 9, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one upwardly protruding dam comprising a plurality of superimposed, contiguous, mutually adhered layers (reg. 115 and 141; column 5, lines 13 and 14 of U.S. Pat. No. 6,013,946).

Regarding claim 10, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 at least one sealing element (since the element 142 seals a gap between the substrate 120a and the chip 130, the element 142 reads as a sealing element) on the first surface of the substrate, the at least one sealing element substantially laterally surrounding the at least one slot.

Regarding claim 16, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 at least one conductive structure (170) protruding from the at least one second contact pad.

Regarding claim 17, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one conductive structure (170) comprising metal (column 7, lines 17 – 18 of U.S. Pat. No. 6,013,946).

Regarding claim 18, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one conductive structure (170) being located between the at least one upwardly protruding dam (115) and an outer periphery of the substrate (120a).

Regarding claim 19, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the at least one upwardly protruding dam (115) being configured to laterally confine a quantity of nonconductive encapsulant (161; column 6, lines 63 – 66 of U.S. Pat. No. 6,013,946) over the at least one slot.

Regarding claim 20, Lee et al. discloses in e.g., Fig. 2 and Fig. 3 the nonconductive encapsulant (161) having a "substantially" planar surface (see Fig. 2).

## *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Knecht (U. S. Pat. No. 5,577,319).

While Lee et al. teaches the use of the dam, Lee et al. does not appear to provide the dam's specific composition to be a photopolymer. Knecht teaches in e.g., Fig. 1 and column 1, lines 54 – 67 a dam (epoxy dam 32; column 2, line 67) being formed by an epoxy. Since epoxy is one of well-known photopolymer material (see column 4, lines 13 and 14 of Ahne et al. U.S. Pat. No. 4,883,730), the epoxy dam of Knecht is formed of a photopolymer. It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the epoxy as the specific material to form the dam on the substrate of Lee et al. as taught by Knecht to reduce parasitic capacitance, signaling problems and the cost of the product (column 1, lines 56 – 67).

8. Claims 11 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. in view of Amagai (U. S. Pat. No. 6,144,102).

Regarding claim 11, while Lee et al. teaches the use of the at least one sealing element, Lee et al. does not appear to provide any example of the at least one sealing element's specific composition to be a semisolid photopolymer. Amagai teaches in e.g., Fig. 2 and column 4, lines 26 – 28 at least one sealing element (8) being formed by an epoxy resin. Since epoxy is one of well-known photopolymer material (see column 4, lines 13 and 14 of Ahne et al. U.S. Pat. No. 4,883,730), the epoxy sealing element of Amagai is formed of a semisolid photopolymer. It would have been obvious to one of ordinary skill in the art at the time when the invention was made to apply the epoxy resin as the specific material to form the sealing element between the semiconductor device and the substrate of Lee et al. as taught by Amagai to reduce the cost of the product and to provide toughness, processibility, chemical resistance, low shrinkage and adhesion (page 1.5, section 1.2.1.3 of Harper, Charles A., "Electronic Packaging and Interconnection HandBook", 1991, pp 1.5 – 1.7, R.R. Donnelley & Sons Company).

Regarding claim 12, it is of note that the claim does not preclude "at least one sealing element" and an "adhesive film" being a single structure. In other words, the claim does not specifically distinguish "at least one sealing element" as a separate structure from an "adhesive film". The element (142; column 4, line 59) of Lee et al. would meet both of these structure limitations. Therefore, claimed structure is held fully met by Lee et al.

Regarding claim 13, Lee et al., as modified, discloses in e.g., Fig. 2 and Fig. 3 the at least semisolid photopolymer (142) being located adjacent at least a portion of an outer periphery of the substrate (120a).

Regarding claim 14, Lee et al., as modified, discloses in e.g., Fig. 2 and Fig. 3 the at least semisolid photopolymer (142) being located adjacent at least a portion of a periphery of the at least one slot (123).

### *Conclusion*

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Katoh et al., Yoon et al., McMillan et al., Schueller, Lin, Lee et al. (U. S. Pat. No. 6,252,298), Kim et al. and Horiuchi et al. disclose a dam on an interposer.

Ahne et al. (U.S. Pat. No. 4,883,730) discloses in column 4, lines 13 and 14 photopolymer material including epoxy.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
Tuesday, December 07, 2004

**GEORGE ECKERT**
**PRIMARY EXAMINER**